

What is claimed is:

5 1. An optically clear laminate suited for attachment to window glass to provide a glazing element which has reduced spall and lacerative consequences on impact fracture of the window glass; said laminate comprising:

(a) a first lamina comprised of optically clear flexible nonadhesive polymeric material having a first major surface and an opposite second major surface;

(b) a scratch-resistant hard coating over said first major surface to provide an exposed surface to the laminate;

10 (c) at least one additional lamina comprised of optically clear flexible nonadhesive polymeric material;

(d) a sufficient number of layers of in situ optically clear pressure sensitive adhesive layers to directly bond said laminae together with the hard coating exposed; and

15 (e) a layer of in situ optically clear ambient temperature attachable pressure sensitive adhesive to bond said laminate to window glass.

2. The laminate of claim 1 wherein each of said laminae has a thickness no greater than about 5 mils (0.13 mm).

20 3. The laminate of claim 1 wherein each of said laminae is comprised of biaxially oriented polyester film.

4. The laminate of claim 1 wherein said pressure sensitive adhesive is comprised of acrylic based copolymer.

25 5. The laminate of claim 1 further including a third lamina comprised of optically clear flexible polymeric material.

6. The laminate of claim 1 wherein the hard coating comprises a cured ceramer.

July 3 7. The laminate of claim 1 wherein once attached to tempered or laminated window glass provides a glazing element which passes at least one of the following ANSI Z-26 tests:

- 5.04 - Two Hour Boiling Water;
- 5.13 - Thirty Foot Ball (9/14 m) Drop;
- 5.17 - Resistance to Abrasion;
- 5.19 - Chemical Resistance; and
- 5.23 - Flammability;

8. The laminate of claim 1 wherein said pressure sensitive adhesive layers are comprised of pressure sensitive adhesive having a shear storage modulus measured at 22°C in the range of about 0.20 MPa to about 0.50 MPa.

9. An optically clear glazing element which has reduced spall and lacerative consequences on impact fracture, said glazing element comprising:

- (a) a first lamina comprised of optically clear flexible polymeric material having a first major surface and an opposite second major surface;
- (b) a scratch-resistant hard coating over said first major surface;
- (c) at least one additional lamina comprised of optically clear flexible nonadhesive polymeric material;
- (d) a sufficient number of layers of in situ optically clear pressure sensitive adhesive layers to directly bond said laminae together with the hard coating exposed;
- (e) a layer of in situ optically clear ambient temperature attachable pressure sensitive adhesive to bond said laminate to window glass; and
- (f) tempered or laminated window glass.

10. The glazing element of claim 9 wherein said window glass is tempered.

11. The glazing element of claim 9 wherein said pressure sensitive adhesive layers are comprised of pressure sensitive adhesive having a shear storage modulus measured at 22°C in the range of about 0.20 MPa to about 0.50 MPa.

12. An optically clear laminate comprising the following components adhered together in the following order:

(a) a scratch-resistant hard coat comprised of cured ceramer;

(b) a first biaxially oriented polyester film having a thickness of not more than

5 5 mils (0.13 mm);

(c) a first pressure sensitive adhesive layer;

(d) a second biaxially oriented polyester film having a thickness of not more than 5 mils (0.13 mm);

(e) a second pressure sensitive adhesive layer;

10 (f) a third biaxially oriented polyester film having a thickness of not more than 5 mils (0.13 mm); and

(g) a third ambient-temperature-attachable pressure sensitive adhesive layer;

wherein said pressure sensitive adhesive layers are comprised of pressure sensitive

adhesive having a shear storage modulus measured at 22°C in the range of about 0.20 MPa

15 to 0.50 MPa.

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C4

Add  
H4

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H9